

composition, and (2) a curative toward the isocyanate groups. The prepolymer composition consists essentially of at least 80 wt% of a stoichiometric "perfect" prepolymer and contains less than 2 wt% unreacted polyisocyanate monomer.

It should be noted that Claim 1 is written in Jepson format. The preamble recites as that which is well known in the art "a non-solid structural polyurethane adhesive composition comprising a polyurethane prepolymer reaction product of a polyisocyanate and a polyol composition and a curative for isocyanate groups." The improvement, or characterization, portion of the claim recites that the polyurethane prepolymer reaction product consists essentially of at least 80 wt% perfect prepolymer and less than 2 wt% polyisocyanate monomer. At page 5/1-6 a "structural adhesive" is defined as a load bearing adhesive and is differentiated from laminating adhesives which are non-load bearing and from hot melt adhesives which are solid materials that are melted at elevated temperatures and applied in liquid form to the substrate. At page 5/15 "non-solid" is defined as including paste and viscous liquids. Thus, the Jepson-type claim merely sets the boundaries for that which is claimed as a structural adhesive and clearly distinguishes such adhesive to those skilled in the art from laminating adhesives and hot melt adhesives.

The advantages afforded by the defined structural adhesive through the use of the controlled structure isocyanate prepolymer include improved cured adhesive strength, improved ultimate adhesive strength, improved ambient, or room temperature, development of strength. Examples 1 and 2 compare structural adhesives using prepolymer compositions meeting the two defined criteria, namely the wt% perfect prepolymer and the wt% residual polyisocyanate monomer, with prepolymer compositions not meeting these requirements. These prepolymer compositions were compared in a structural adhesive composition containing the prepolymers of Table 1 and curatives Arcol PPG 2025 and Quadrol. Both MDI and TDI based prepolymers were evaluated.

Table 2 shows that Prepolymer 5 according to the invention gave superior shear strength compared to Prepolymer 6 after room temperature curing and aging for one day and seven days as well as after heat cure and then room temperature aging for one day and seven days. Table 3 shows that structural adhesives containing Prepolymers 1 and 3 according to the invention showed faster room temperature development and strength after one day and superior % cure (1d/7d) than those adhesives containing Prepolymers 2 and 4, which are outside the claims language. Such an improvement in shear strength of the structural adhesives according to the invention whether cured at room temperature or heat

cured is surprising and unexpected because it is not taught or suggested in any of the prior art.

With regard to the IDS filed 12 August 2002, attached is another Form PTO-1449 appropriately filled out regarding the European Search Report previously sent.

Applicants do not understand the "12 April 2001, no cover page or sheet" remark by the Examiner. Please clarify what is missing.

Applicants regret the missed numbering of the submitted original set of claims and gratefully acknowledge the Examiner's renumbering as Claims 7-12 with the dependency numerals in Claims 8-12 appropriately changed.

Regarding the Examiner's objection to an informality in the disclosure at page 7/13, Applicants do not believe the second comma must necessarily be deleted. The sentence reads perfectly fine with both commas present. Reconsideration is requested.

Claims 7-12 were rejected under 35 USC 112, second paragraph. The Examiner has suggested changing "to" in line 4 of Claim 7 to "with". Applicants have made such amendment to Claim 7 and request reconsideration and withdrawal of this rejection.

Claims 1-12 were rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1-22 of US 6,280,561 (McInnis) in view of US 6,180,744 (Taylor). The Examiner's position is that it would have been obvious to one of ordinary skill in the art to incorporate a curing (crosslinking) agent of the type taught in Taylor in the adhesive composition of McInnis. Applicants submit this rejection is untenable since both references are deficient with respect to a teaching or suggestion of the claimed subject matter as a whole, i.e., structural adhesives comprising the defined prepolymer in combination with a curative to provide and demonstrating the superior shear strengths shown in Applicants examples.

Applicants have not submitted a Terminal Disclaimer for it is their contention that McInnis in view of Taylor does not render Claims 1-12 obvious. First of all both references are directed to moisture curable hot melt adhesives which are solid at room temperature and need to be heated to melting point to be applied as a liquid in contrast to the "non-solid" structural adhesives defined by the presently pending claims. The claimed structural

adhesives are two component adhesives comprising a defined prepolymer component and a curative component. Both McInnis and Taylor merely suggest that crosslinking agents and catalysts may optionally be included in their compositions. Neither reference provides the necessary direction to a worker of ordinary skill in the art to utilize the defined prepolymer in combination with a curative to provide structural adhesives demonstrating the superior shear strengths shown in Applicants examples.

In view of the above remarks, Applicants request reconsideration of this obviousness-type double patenting rejection and its withdrawal.

Claims 1-12 are rejected under 35 USC 102(e) as being anticipated by McInnis. Again Applicants respectfully submit that the Examiner has failed to make out a case of anticipation or even a case of obviousness by the McInnis patent. Applicants are claiming a non-solid structural adhesive composition containing both the defined prepolymer composition and a curative to provide the unexpected shear strength improvement. McInnis is directed to moisture curable hot melt compositions that require application of the adhesive by heating to melt it. McInnis only suggests catalysts and other compounds may be included in his compositions.

Even if McInnis made out a prima facie case of obviousness there is no expectation or suggestion to a worker of ordinary skill in the art in this reference that structural adhesives as defined in the pending claims would provide the unexpected shear strength properties.

Claims 1-12 were also rejected under 35 USC 103(a) as being unpatentable over McInnis in view of Taylor. This rejection is essentially the same as the earlier obviousness-type double patenting rejection. The stated deficiencies of the references and the arguments set forth with regard to the obviousness-type double patenting rejection are equally applicable here and reference is made to the previous remarks. In view of McInnis and Taylor being directed to moisture curable hot melt compositions and the present claims being directed to non-solid structural adhesives manifesting unexpected shear strengths, Applicants submit that Claims 1-12 define patentable subject matter as a whole.

In view of the above remarks, Applicants request reconsideration of this 103(a) rejection and its withdrawal.

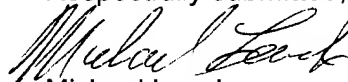
Claims 1-12 are also rejected under 35 USC 103(a) as being unpatentable over Taylor in view of either Heiss or Marans. The deficiencies with regard to the Taylor reference as neither being directed to non-solid structural adhesive compositions which must contain a curative as well as the defined prepolymer composition are not remedied by either of the secondary references Heiss or Marans which merely teach the removal of unreacted polyisocyanate monomer in prepolymer compositions. None of these three references in any manner of combination suggests the claimed non-structural adhesive compositions manifesting the improved shear strength properties shown in Applicants examples.

In view of the above remarks, Applicants request reconsideration of this 103(a) rejection and its withdrawal.

In summary, Applicants must reiterate that their Type-type claims are directed to two component non-solid structural adhesive compositions manifesting surprising shear strength properties compared to such adhesive compositions containing prepolymers containing less than the requisite perfect prepolymer content (i.e., greater oligomer content) and greater free polymer isocyanate monomer content. While the Examiner may recite references which teach moisture curable hot melt adhesives containing a similar perfect prepolymer content and references suggesting the incorporation of crosslinking agents among many other suggested additives and other secondary references teaching the removal of free polyisocyanate monomer below 2 wt% level, none of these references individually or in any combination suggest Applicants, claimed subject matter as a whole including the unexpected results.

Applicants in view of the above remarks solicit an action passing the Application to allowance.

Respectfully submitted,



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Enclosures

VERSION WITH MARKINGS TO SHOW CHANGES MADE

7. (Amended) A method for adhesively joining or sealing two substrates using a structural polyurethane adhesive composition which comprises applying onto a substrate the non-solid structural polyurethane adhesive composition of Claim 1, and contacting the adhesive composition disposed on the substrate ~~to~~ with a second substrate such that a bond is formed.